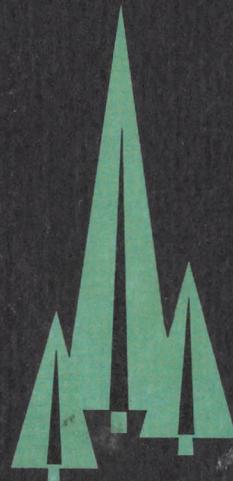


# Highlights of the Hinton Mill...

HOME of  
ALBERTA

Hi-Brite

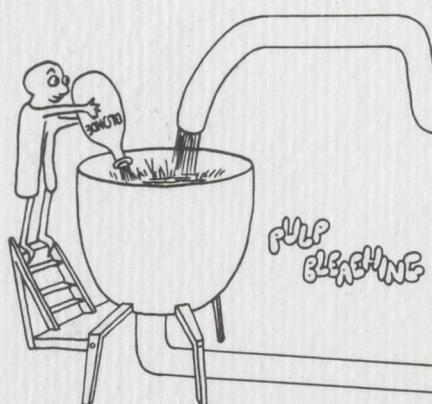
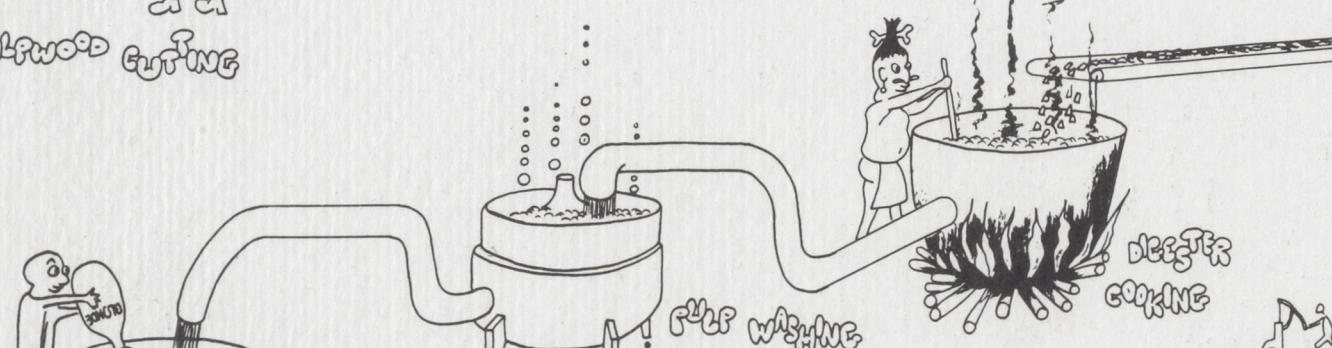
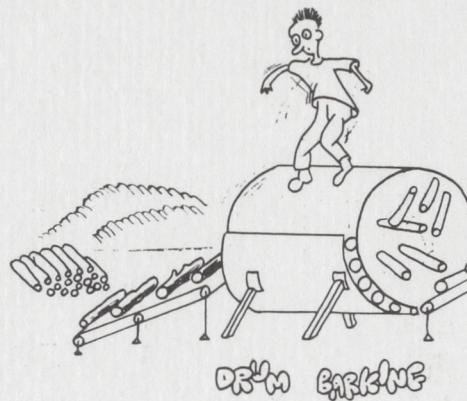
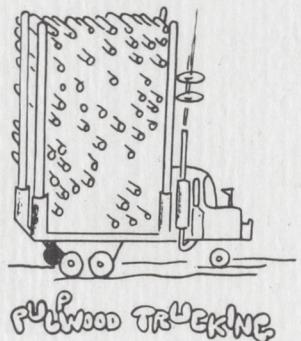
KRAFT  
PULP



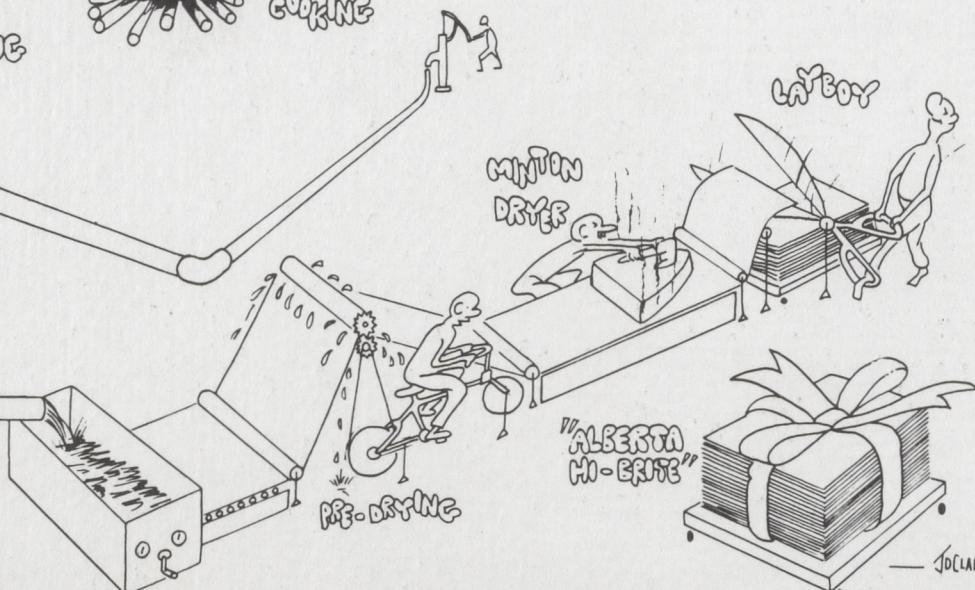
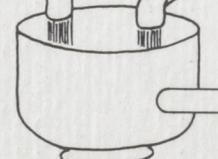
NORTH WESTERN PULP & POWER LTD., A WHOLLY OWNED SUBSIDIARY OF

**STREGIS** PAPER COMPANY

# How To Make "ALBERTA HI-BRITE" Bleached Kraft Pulp



WASHING &  
DILUTING



— JO CLARK —

This brochure describes our woodlands and mill operations, and was written in response to the hundreds of requests for information that we receive from students in all levels of learning, from the primary grades to university.

It is hoped that our story will be of value and interest to people of all ages, whether at the beginning of or beyond formal education.

You are cordially invited to write to us further if any information that you require is not found in this booklet. Better still — plan to visit our plant. We would be happy to show you our facilities.

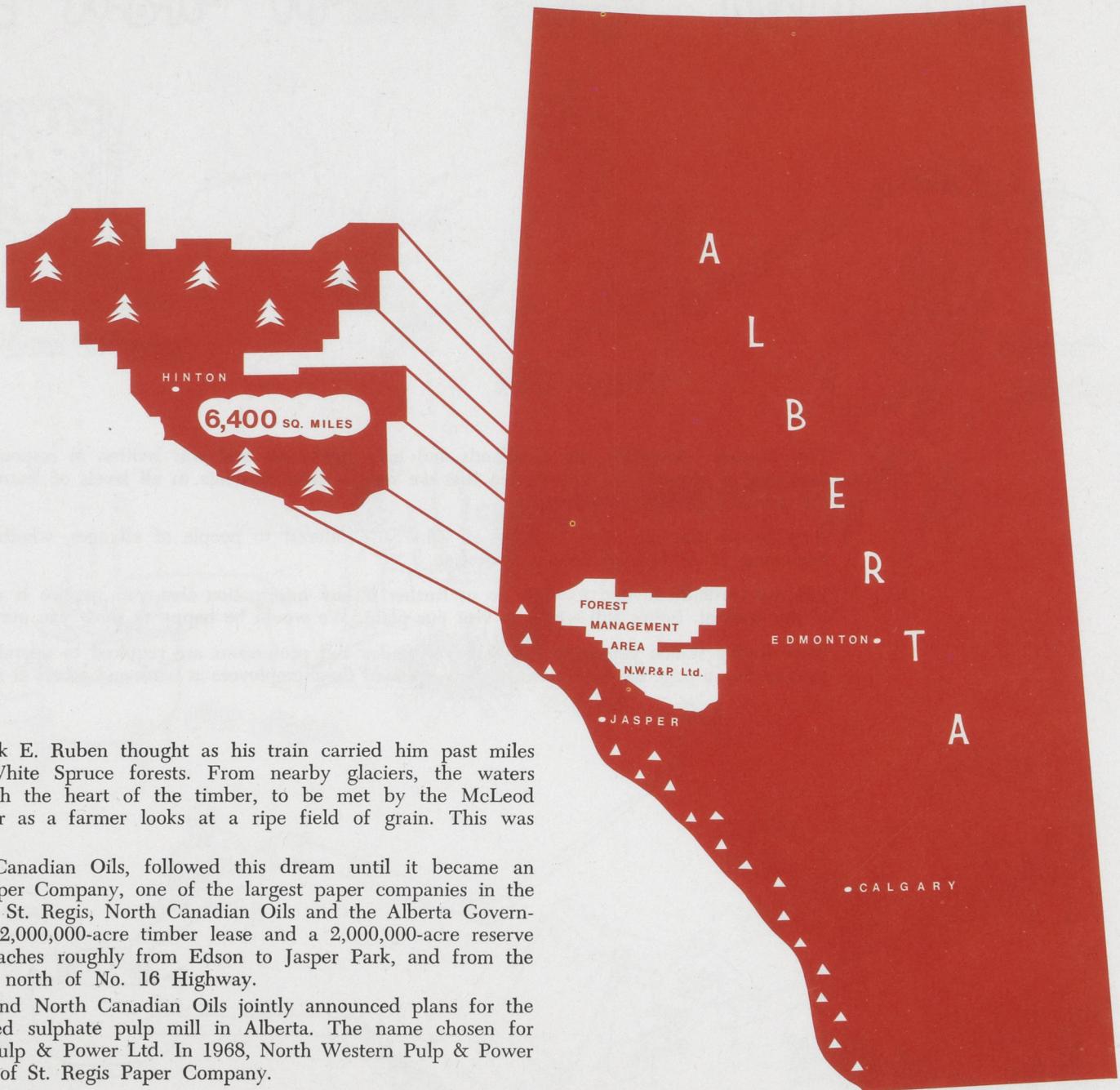
Since highly skilled people in a number of trades and professions are required to operate a plant such as this, a page has been used to show a few of these employees at work and others at recreation.

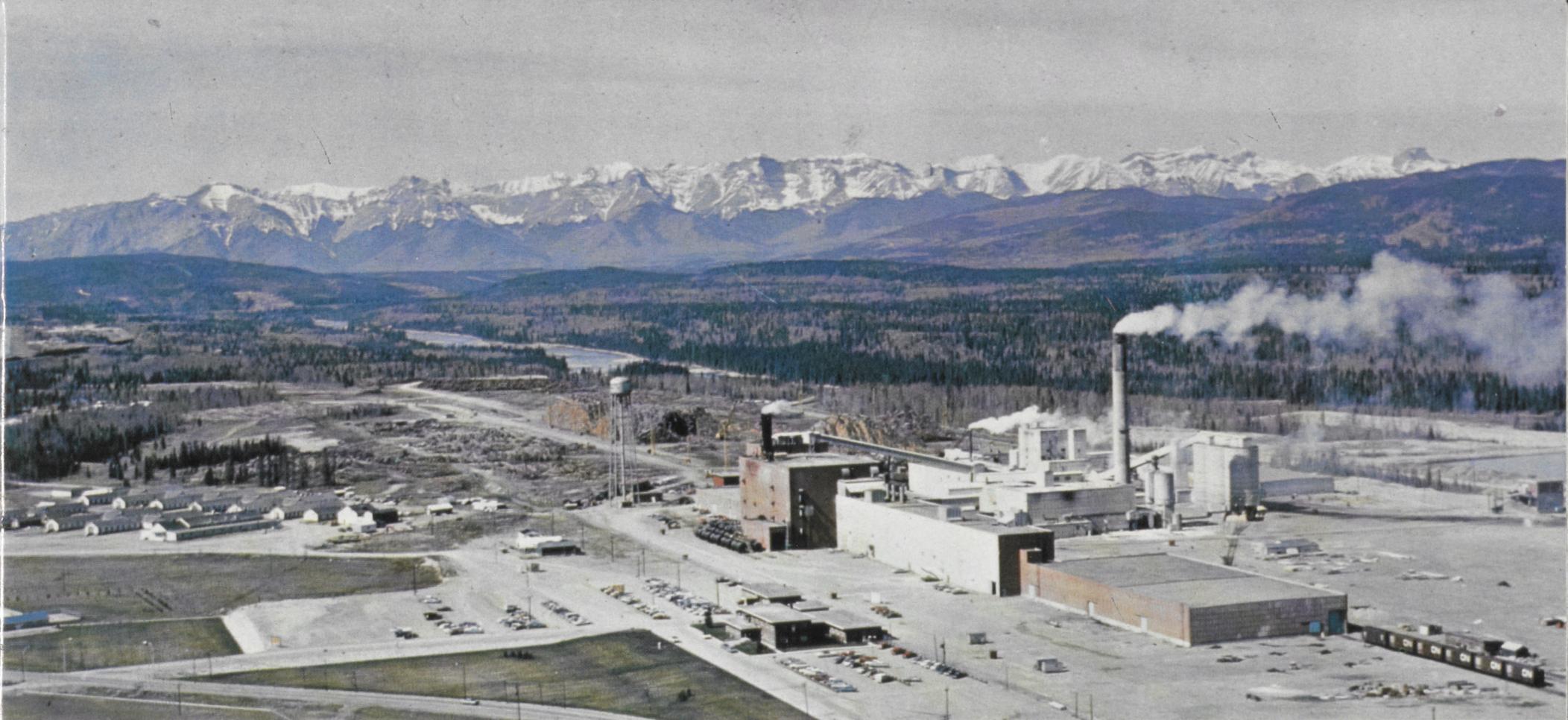
## INTRODUCTION

"Green Gold." That is what Frank E. Ruben thought as his train carried him past miles of tall, straight Lodgepole Pine and White Spruce forests. From nearby glaciers, the waters of the Athabasca River cascaded through the heart of the timber, to be met by the McLeod River far below. He surveyed the timber as a farmer looks at a ripe field of grain. This was a crop which industry could use.

Mr. Ruben, President of North Canadian Oils, followed this dream until it became an eventuality. After interesting St. Regis Paper Company, one of the largest paper companies in the U.S.A., many summit meetings involving St. Regis, North Canadian Oils and the Alberta Government led to the decision to take out a 2,000,000-acre timber lease and a 2,000,000-acre reserve with a fifteen-year option. This area reaches roughly from Edson to Jasper Park, and from the Coal Branch to the south to fifty miles north of No. 16 Highway.

On June 17th, 1954, St. Regis and North Canadian Oils jointly announced plans for the financing and construction of a bleached sulphate pulp mill in Alberta. The name chosen for the new Company was North Western Pulp & Power Ltd. In 1968, North Western Pulp & Power Ltd., became a wholly-owned subsidiary of St. Regis Paper Company.





## HISTORY OF HINTON

The advent of North Western Pulp & Power Ltd. resulted in Hinton's third big boom. The first was around the turn of the century when Hinton became an important outfitting centre on the Great North Trail originating in Montana and leading to Dawson Creek in the Peace River Country. The town was named after W. D. Hinton, Vice-President of the Grand Trunk Pacific Railroad.

The second boom was in 1912 when Hinton was headquarters for the firm of Foley, Welsh and Stuart, builders of the Grand Trunk Railroad grade to Jasper. Their original powder cache is still in evidence three miles north of No. 16 Highway.

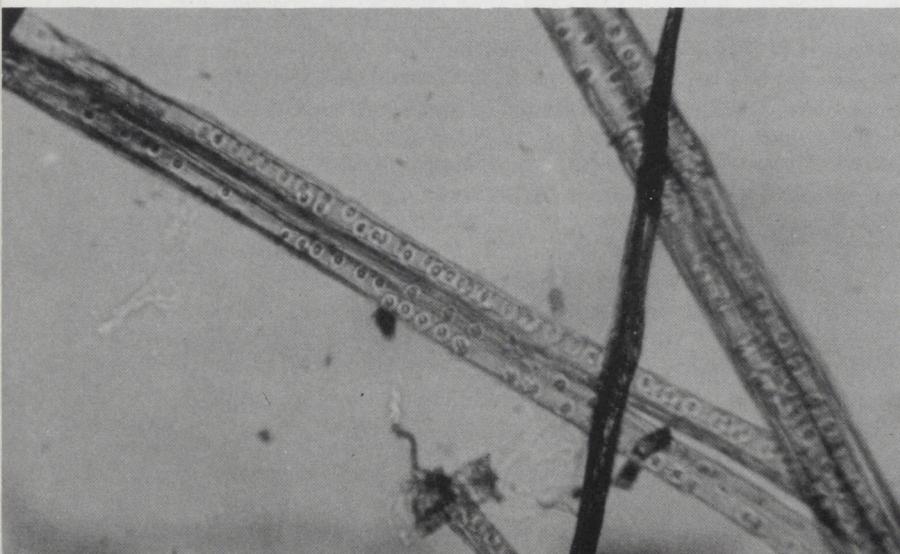
Right after the railway boom, Hinton became a mining town when a conductor on the Grand Trunk Railroad, Harry King, operated a coal mine as a sideline to his railway job. Other small mines also came into being.

In 1955 when the construction crews moved in to build North Western's mill, the population of Hinton was 180 persons. Within a decade this number soared to well over 4,000.

## WHAT IS PULP?

Pulp is a conglomeration of millions of tiny cellulose fibres. Cellulose is the basic substance of wood. Fibres, cemented together by nature in the particular pattern that we recognize as wood, may be liberated by dissolving nature's cement, the lignins and resins in wood. Once free, these fibres can be washed and bleached, and then matted together again in the form that we know as paper. By tearing a piece of paper, you will be able to see along the frayed edge, the minute, hair-like fibres that have been matted and pressed together to form the thin sheet.

This booklet attempts to explain how cellulose is harvested from the forest, transported to the mill, and processed to provide pulp – the raw material of the paper maker.

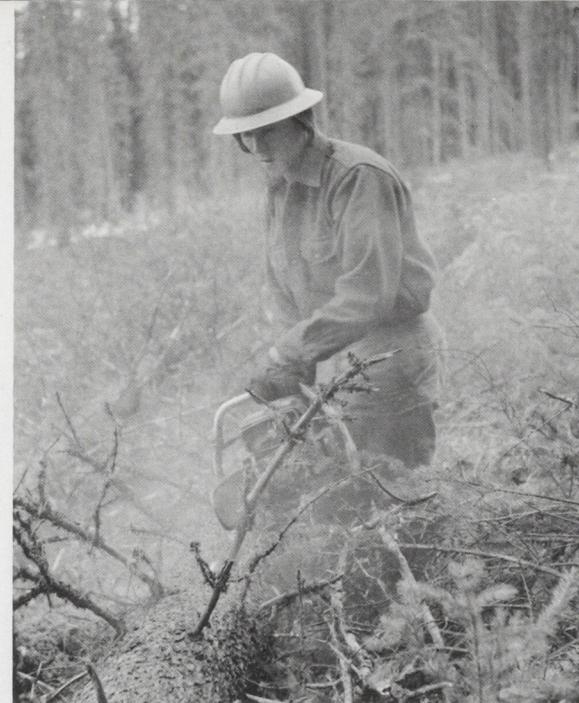


*Pulp fibre  
enlarged 160 times*





*Felling*



*Limb ing*



*Skidding with a wheeled tractor*

*Loading*



*Stacking tree length logs  
at a landing.*

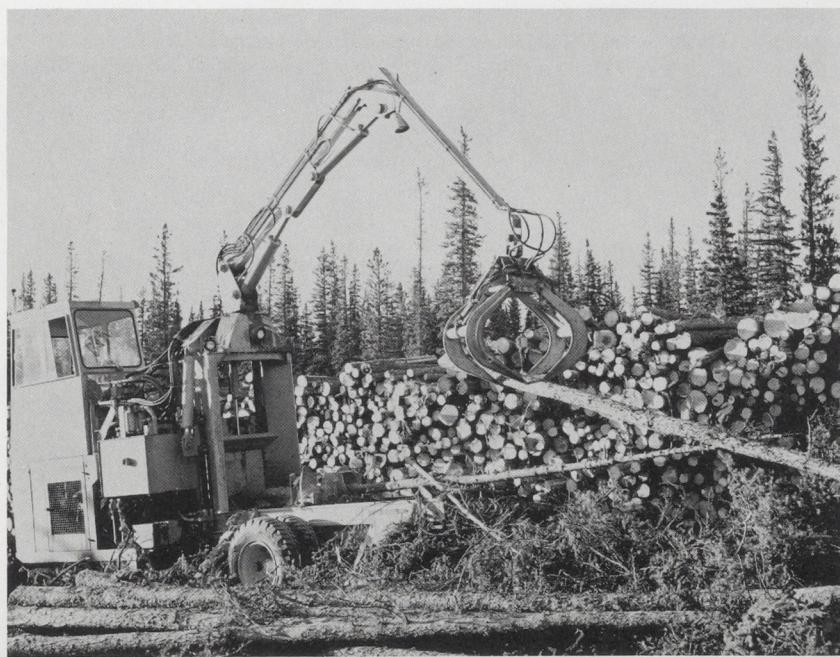
A recent improvement was to omit bucking and scaling in the bush, and to haul logs to the mill woodyard in tree lengths.

*and Hauling*





*Logs ready  
to haul*



*Trying new equipment*





*The Company has 250 miles of all-weather roads*

*Bridge across the Athabasca River*



# WOODYARD



60 ton *Le Tourneau*



*Slasher deck*

*Lumber Jack placing  
wood on slasher*





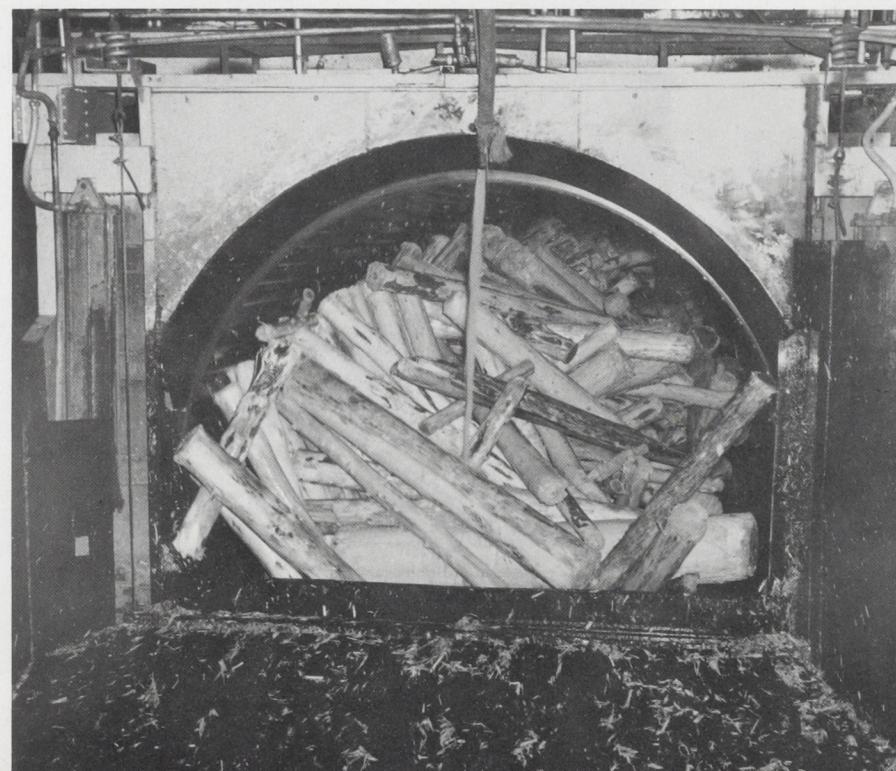
*Woodsorters remove logs from the sorting deck which have not lost all of their bark. They are sent back on a reclaim conveyor to be put through the drum barker again.*

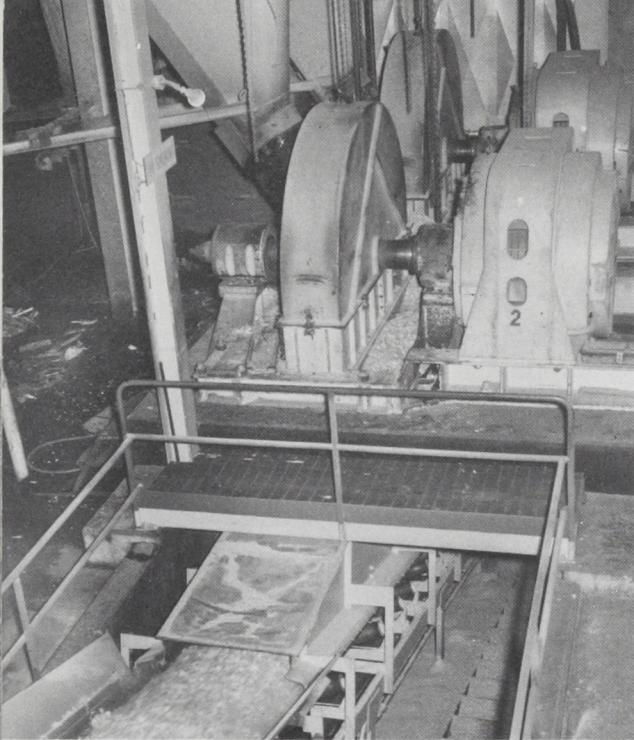
## THE LOG

The tree-length logs of Lodgepole Pine, White and Black Spruce and Alpine Fir which have been hauled by huge trailer trucks from the pulpwood cutters' piles to the Company's woodyard, are carefully examined and measured by scalers. Cranes or stackers unload the trees in piles or on the slasher deck for processing.

A flume, 1,812 feet in length, floats the logs in moving water to a jack-ladder which conveys each log into the woodroom, and thence to one of three barking drums, each 67½ feet long by 12 feet in diameter. The logs lose their bark as they roll around inside the revolving drums, continually rubbing against each other and against the cleated sides of the barking drums.

*A drum barker*



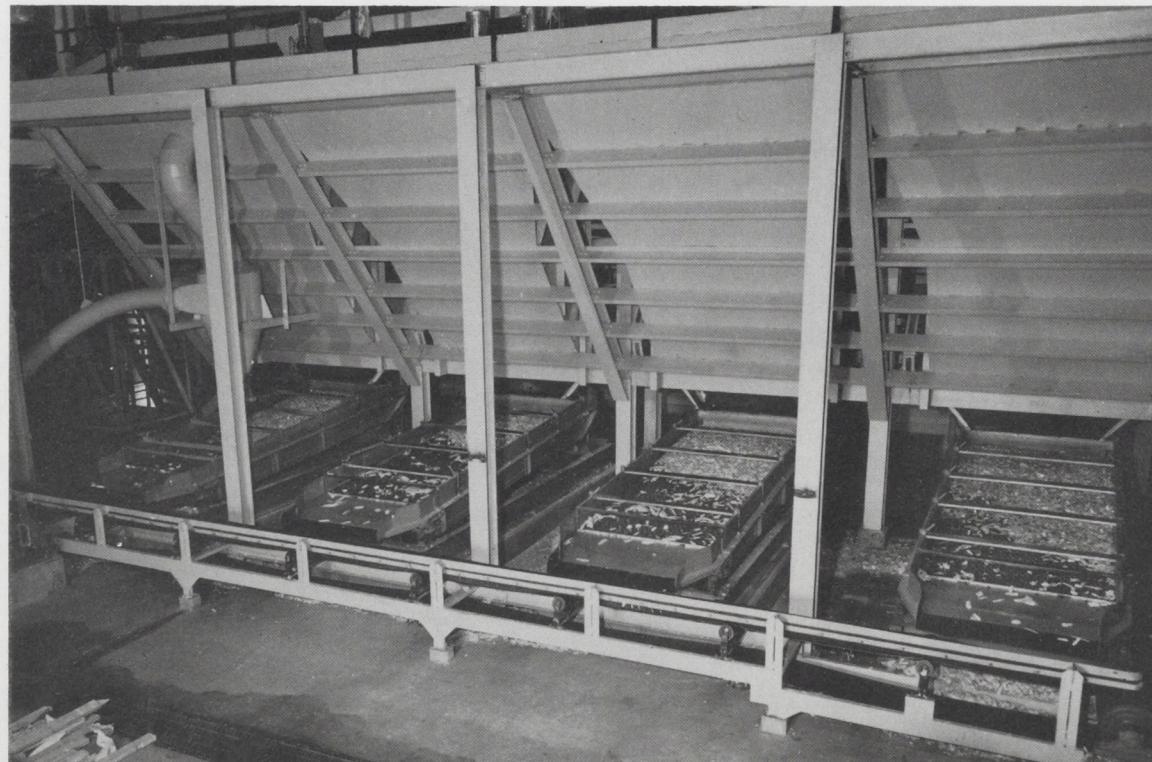


*The chippers*

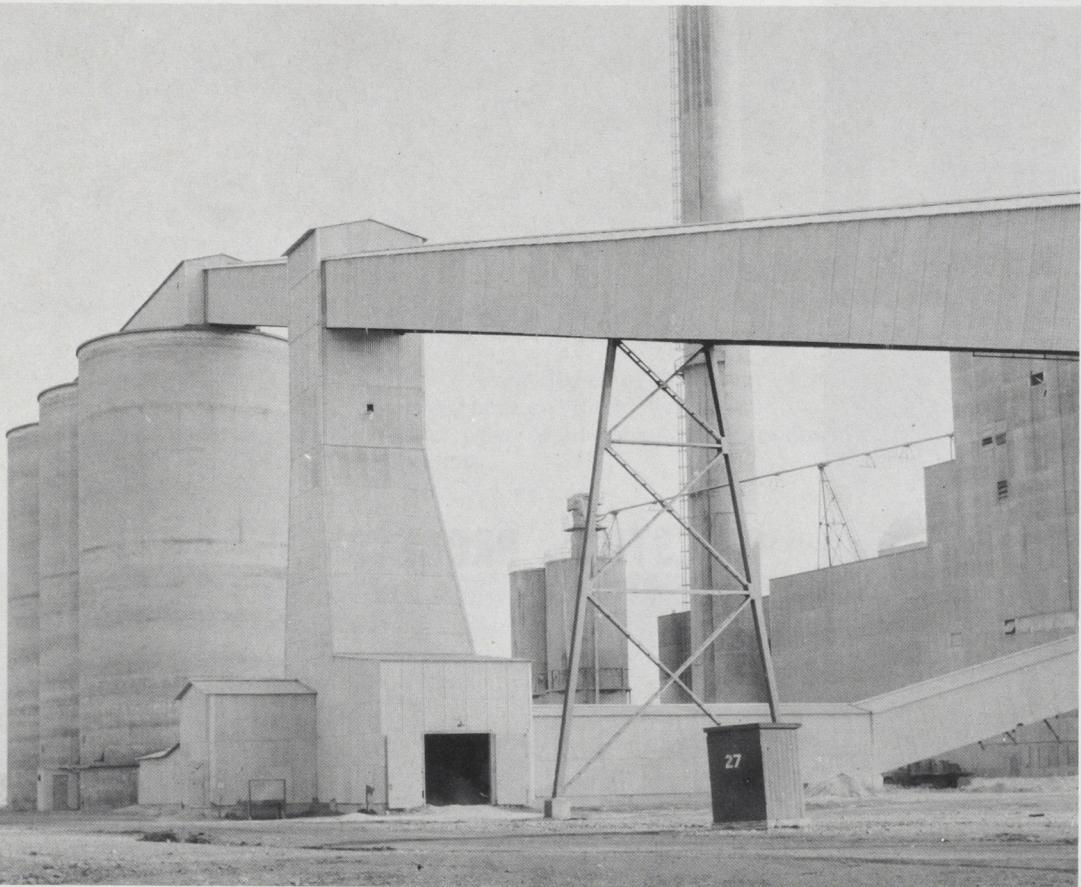
## THE CHIP

The barked log is conveyed to one of two chippers in each of which are mounted twelve 21" knives which revolve at 400 revolutions a minute. A log 100 inches in length by 20 inches in diameter is sliced into  $\frac{3}{4}$ -inch chips in about three seconds.

These chips are then screened over chip screens for uniformity of size which is imperative in order to maintain uniformity of cooking at a later stage of operation. Oversize chips are routed through a "re-chipper" and thence again over the screens, and from there by belt conveyor to one of three concrete storage silos.

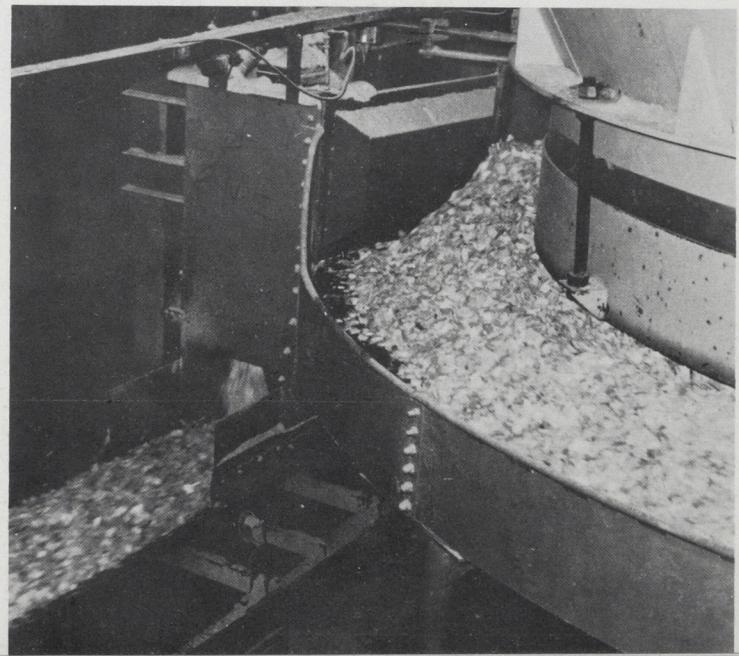


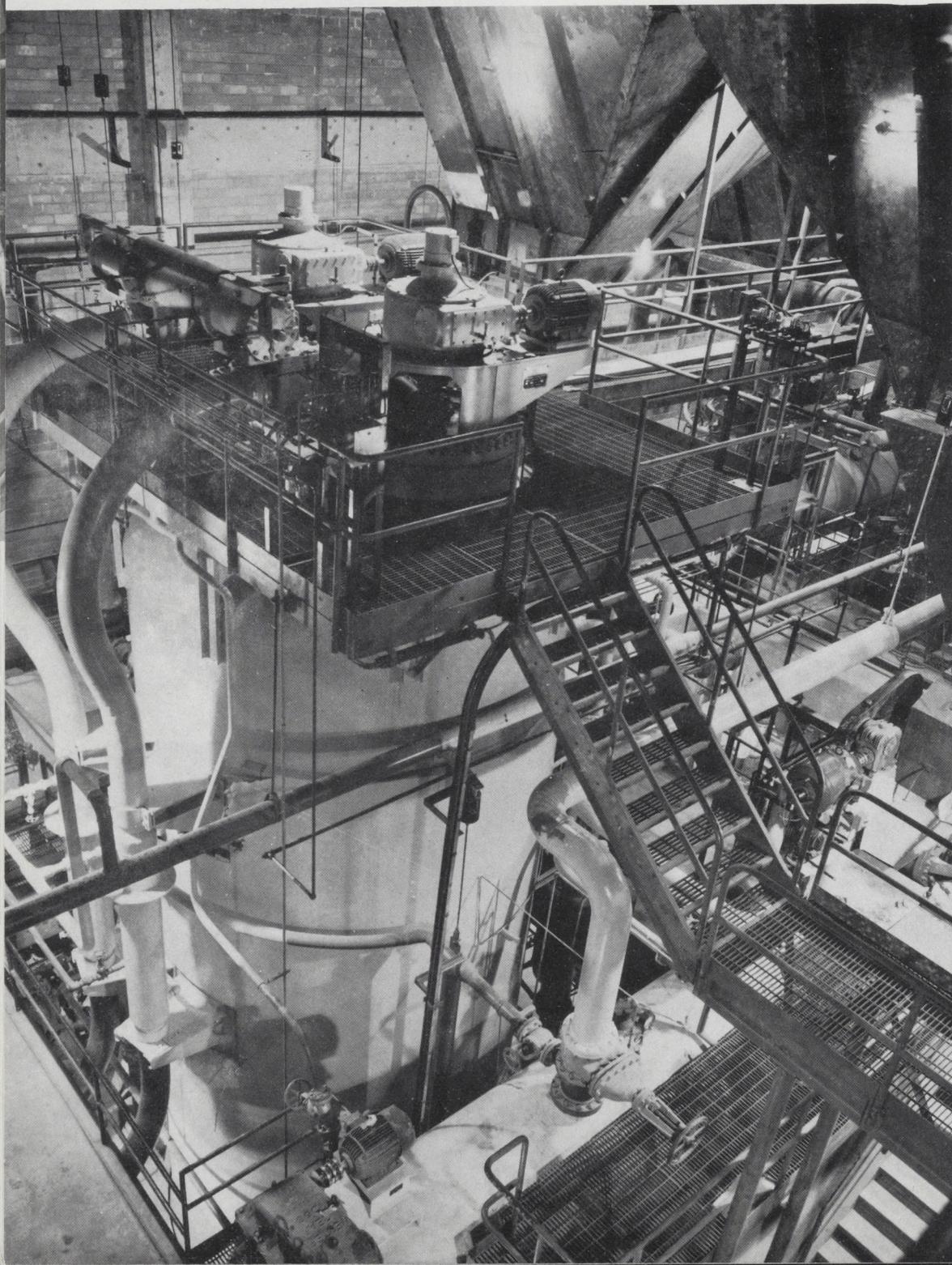
*The chip screens*



*Concrete chip silos*

*The chip silo outfeed*





## DIGESTING PROCESS

Wood chips are taken from the storage silos to two gigantic "pressure cookers" where they are cooked under heat and pressure assisted by solutions of caustic soda and sodium sulfide. This action is known in the pulp and paper industry as "digesting." The object of cooking or digesting the wood chips is to separate the wanted cellulose fibres from the unwanted water and non-cellulose constituents of wood such as lignins or binding material.

The two digesters are 95 feet high, 13 feet in diameter and contain a volume of 10,800 cubic feet. They are "continuous" digesters—that is, raw materials are fed continuously and the cooked materials ejected continuously, as opposed to the principle of digesting one "batch" at a time.

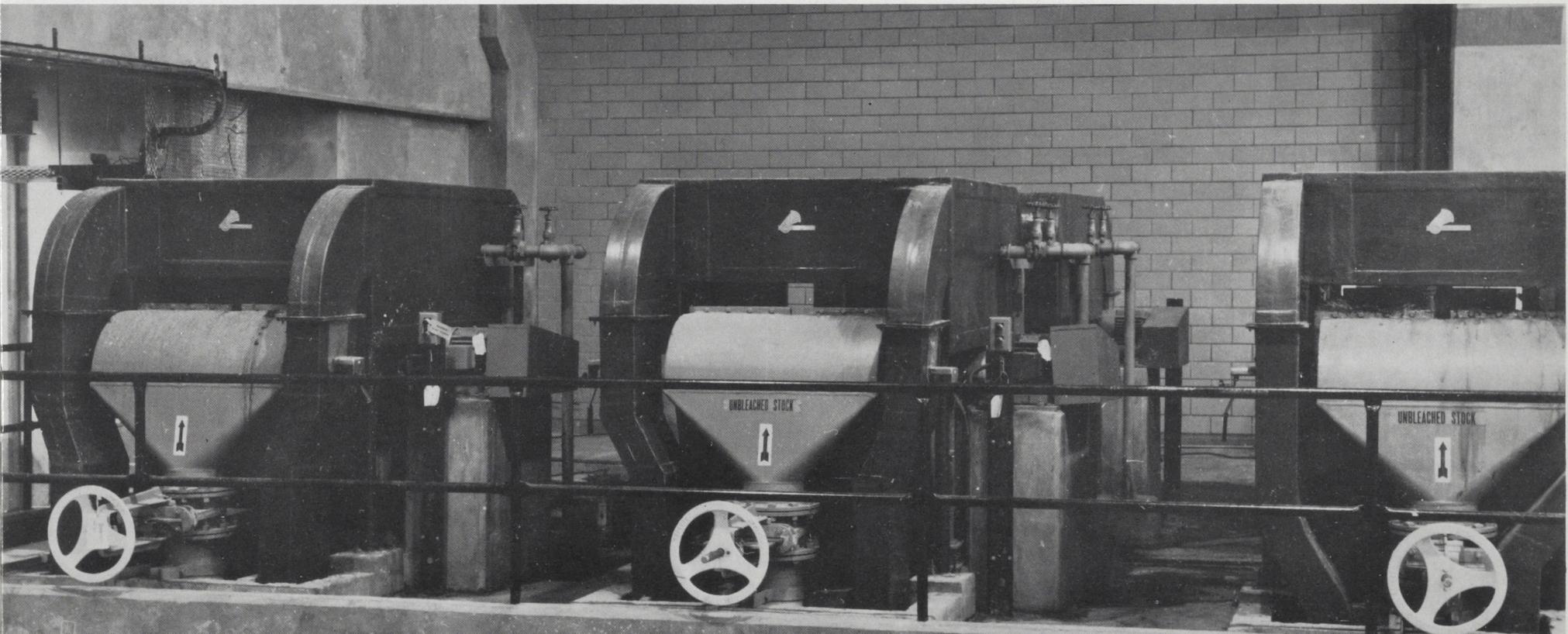
The cooking solution referred to above is called "liquor."

*Top of a digester*

## BROWN STOCK WASHERS

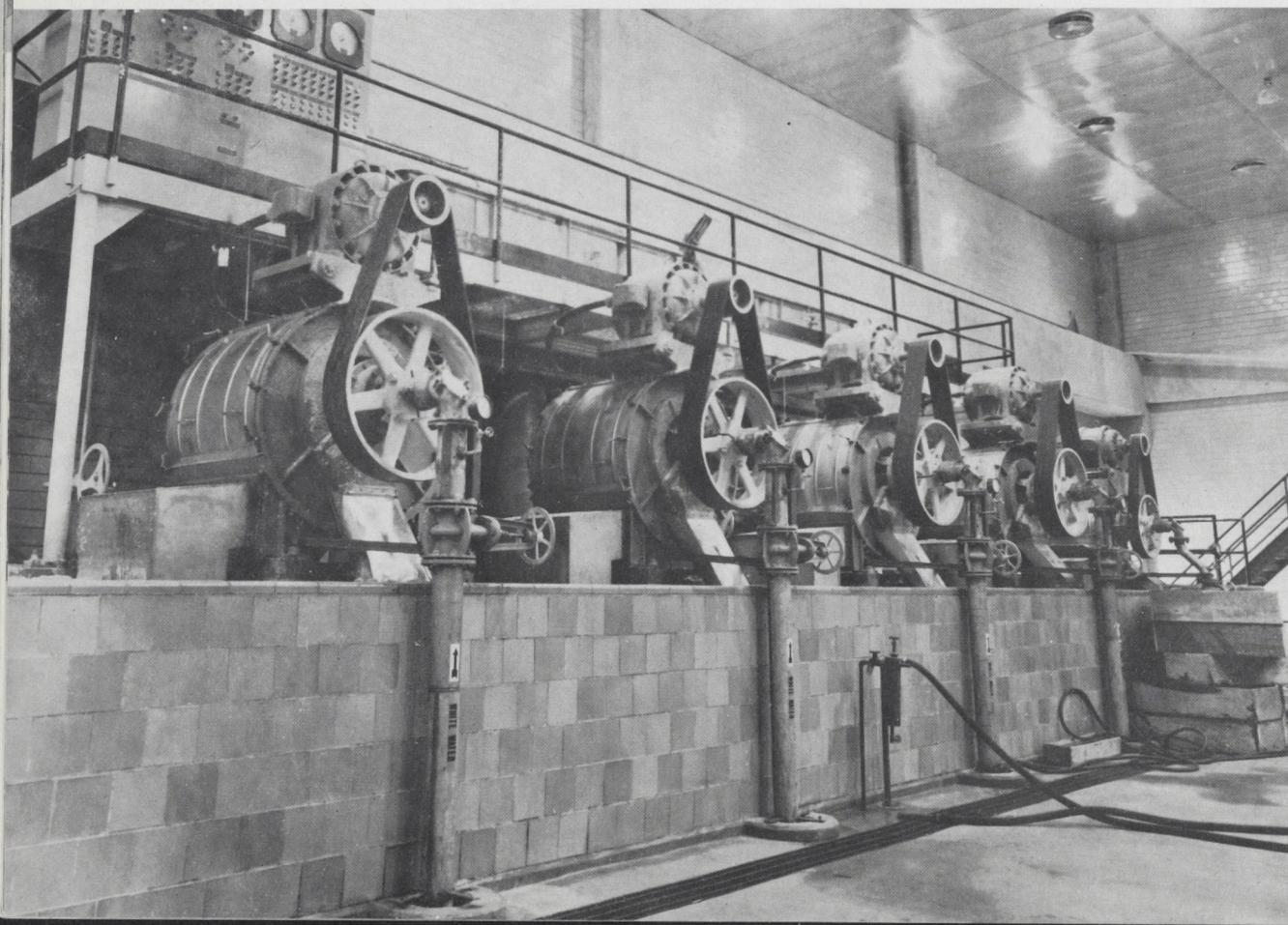
Prior Screening is by way of six Jonsson Knotters each handling up to 125 tons of stock per day. There are three Washers and one Decker to remove residual cooking chemicals from the cooked fibre prior to bleaching. The residual cooking chemicals reclaimed here are sent to the Recovery Section.

*"The Jonsson Knotters"*



## BROWN STOCK SCREENING

The Cowan screens shown below consist of cylindrical drums which house stainless steel slotted plates. The drums rotate in a vat of pulp slurry and all of the accepted fibre must pass through these slots before bleaching.



*"The Cowan screens"*



*The bleach plant*

## BLEACHING PROCESS

The purpose of bleaching is to remove any further impurities from the wood fibres. Pure wood fibre is white, and since bleaching very nearly completes the separation of cellulose (wood fibre) from the other materials in the wood it actually is a means of whitening or brightening the pulp. Bleaching at this plant is performed in six stages: chlorine, caustic extraction, hypochlorite, chlorine-dioxide, second caustic extraction, second chlorine-dioxide.



## BLEACHED STOCK SCREENING

After bleaching, the pulp is again screened to ensure positive removal of any dirt or carbonate scale.

In this operation, there are 168 Vorject centrifugal cleaners. The pulp enters these cones tangentially at the top or larger part. Through centrifugal action, the dirt or rejected fibre is discharged through the small end and eventually into the sewer.

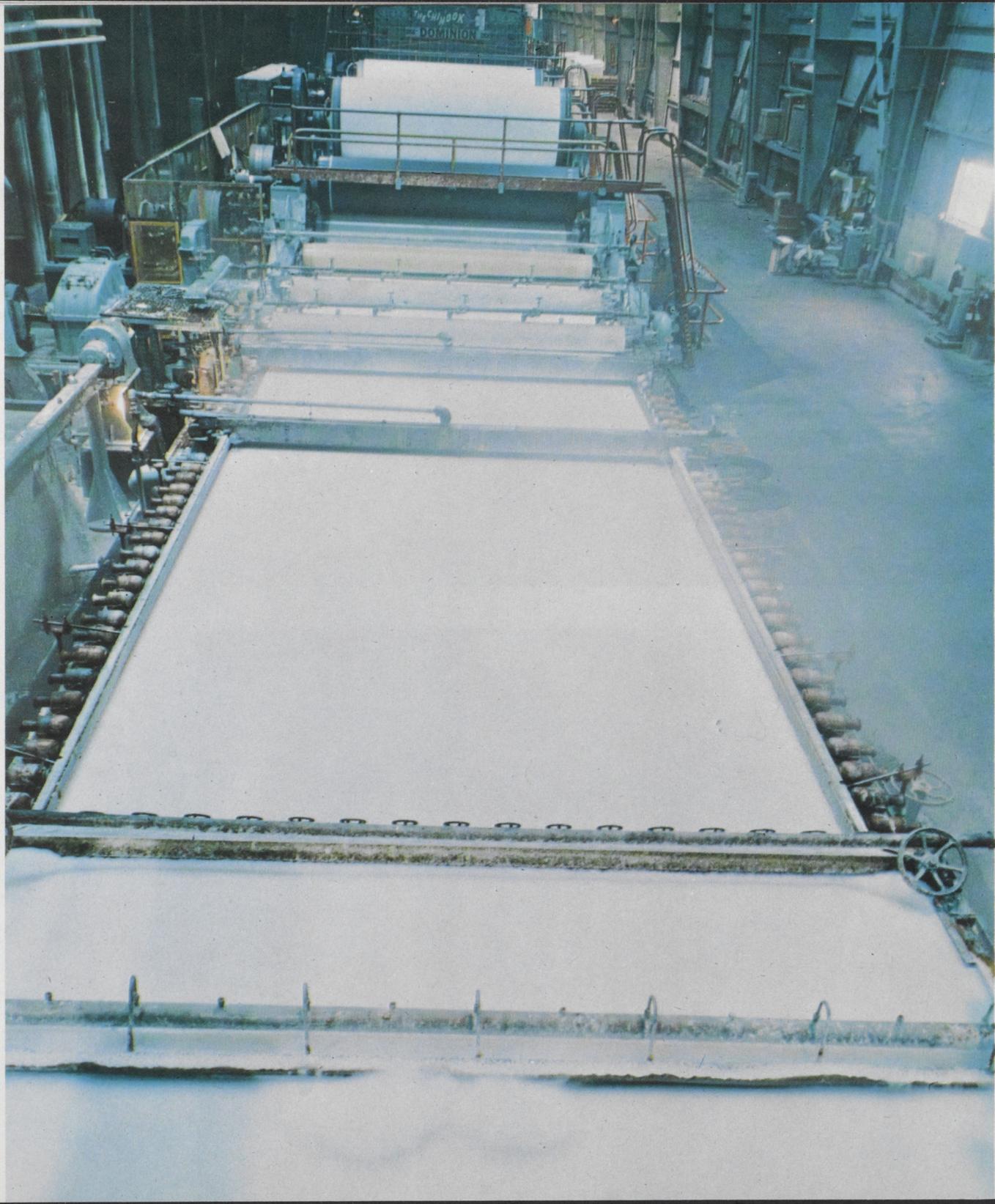
*The centri-cleaners*

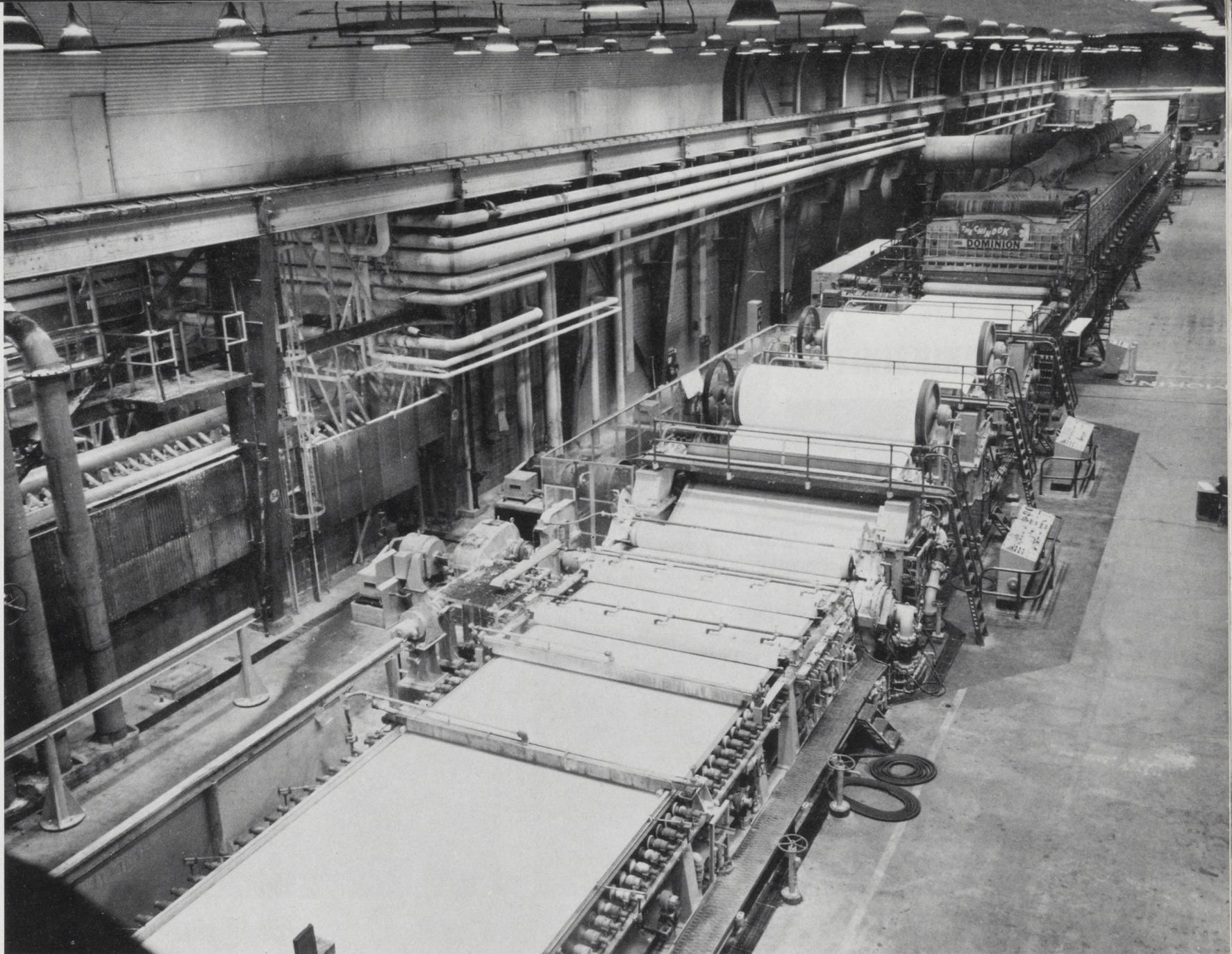
## DRYING PROCESS

Now that the fibres have been separated, washed, selected for size, bleached and rescreened for further selection and any possible dirt removal, the next step is to dry the pulp in the form of a mat or sheet.

Pulp drying is accomplished on a machine over 200 feet in length called a Minton Vacuum Dryer. It consists of three separate units: the Fourdrinier section to form and drain the pulp sheet; the Pre-Dryer and press section to dry further by heat and pressure; and the Vacuum section to accomplish final drying.

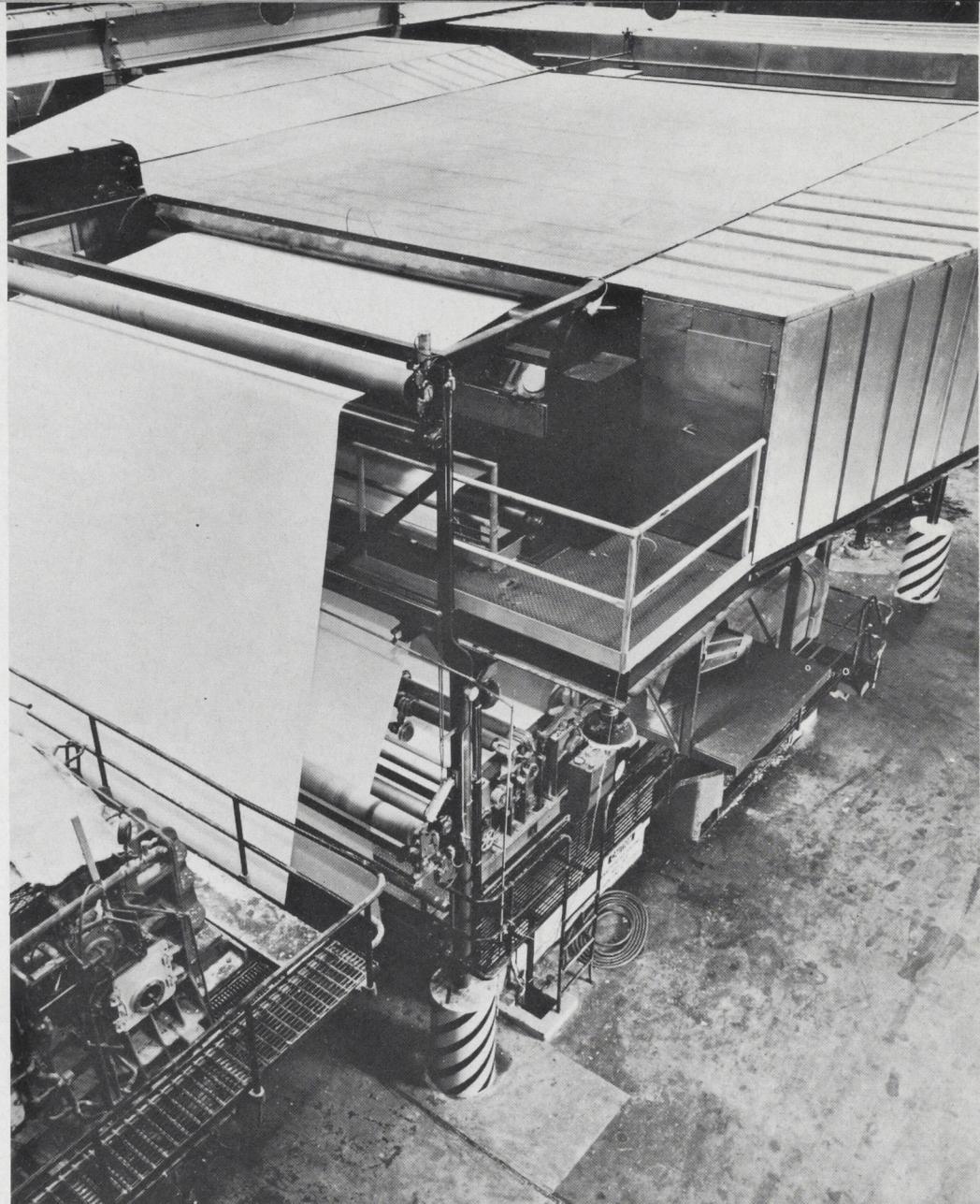
Our pulp is dried to a specific moisture content depending on the customer's specifications.





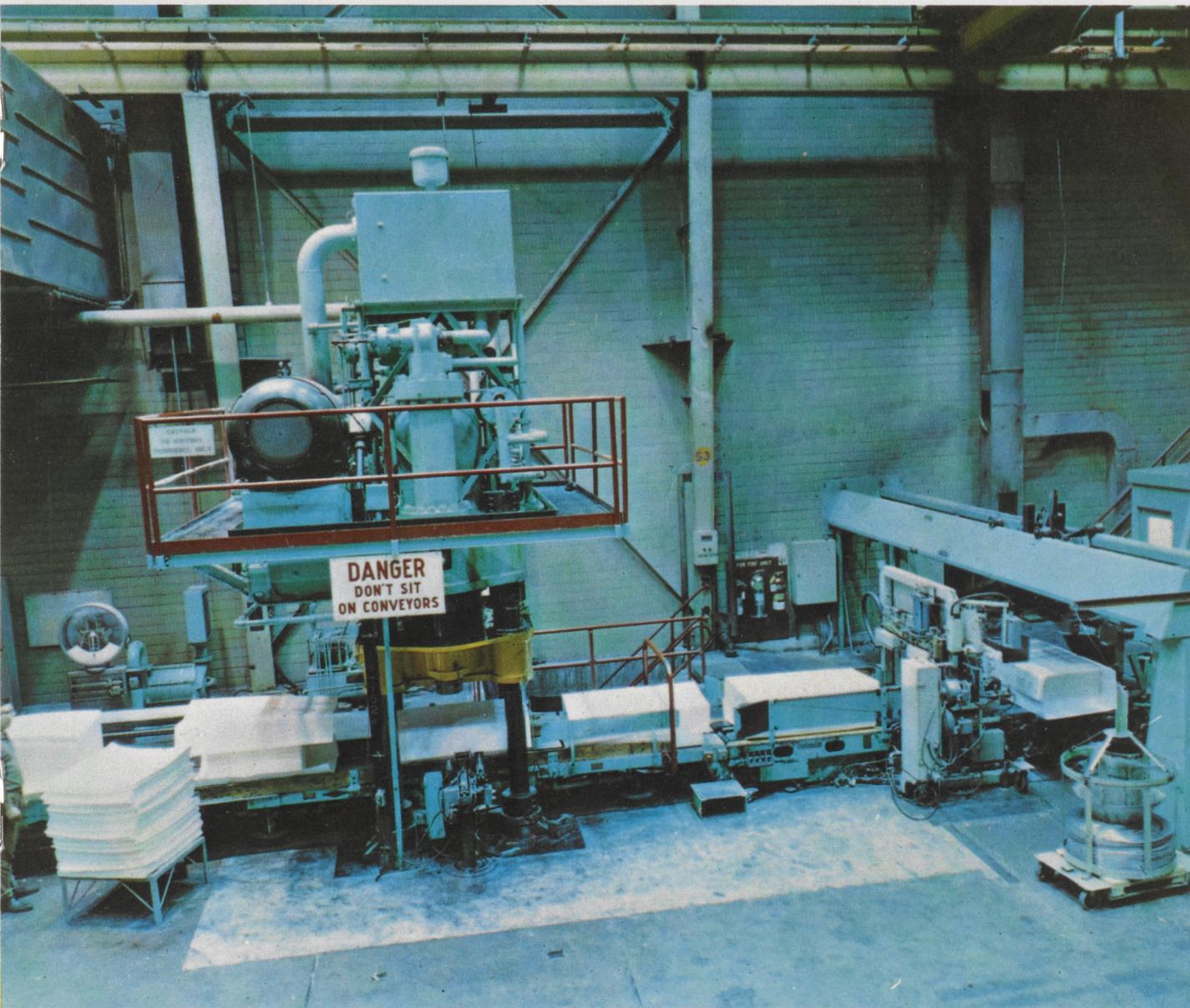
*The Machine Room*

*The sheet cooler*



*The Layboy*





*Bale finishing*

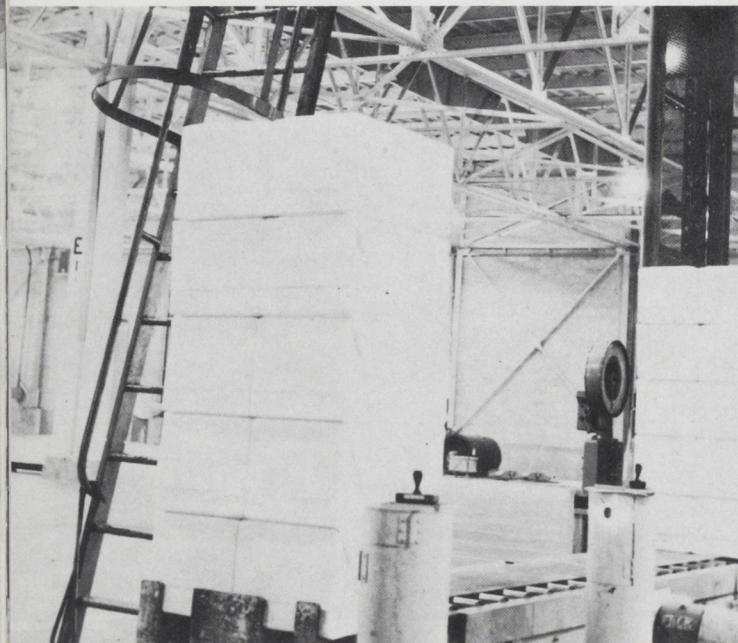
## FINISHING PROCESS

In order to make as neat a package as possible for our customers, and to reduce handling and transportation problems, the pulp is fed through a "layboy" or cutter where it is cut into sheets about 32 inches by 30 inches. The sheets are stacked to a certain height, then discharged from the layboy to a Toledo scale. Here each bale is accurately weighed to 569 pounds. A top and bottom wrapper are applied to ensure that a clean product arrives at the customer's warehouse.

Next, each bale is compressed in a 1,000-ton press to the height of 14 inches; the "Alberta Hi-Brite" label is applied; the bales are tied with wire and sent by conveyor belt to the warehouse for shipping.

## STORING and SHIPPING

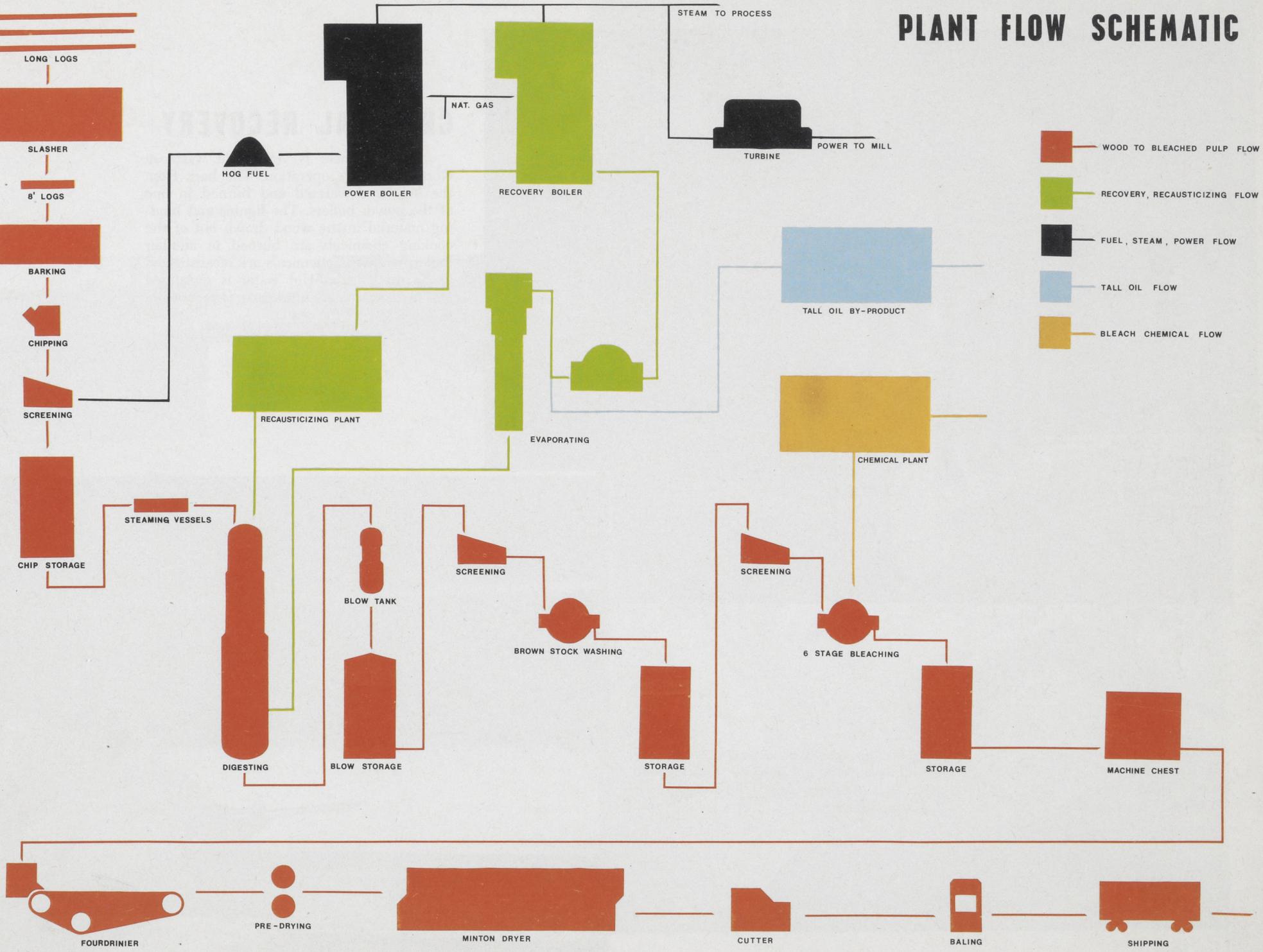
When the pulp bale is conveyed from the finishing room to the warehouse by rubber belt, it arrives at a lowerator-stacker which automatically stacks the bales five at a time and lowers them one storey to the warehouse floor. Men on forklift trucks then load the five-bale stacks (total weight 1½ tons) into freight cars or pile them on wooden pallets to await shipment.

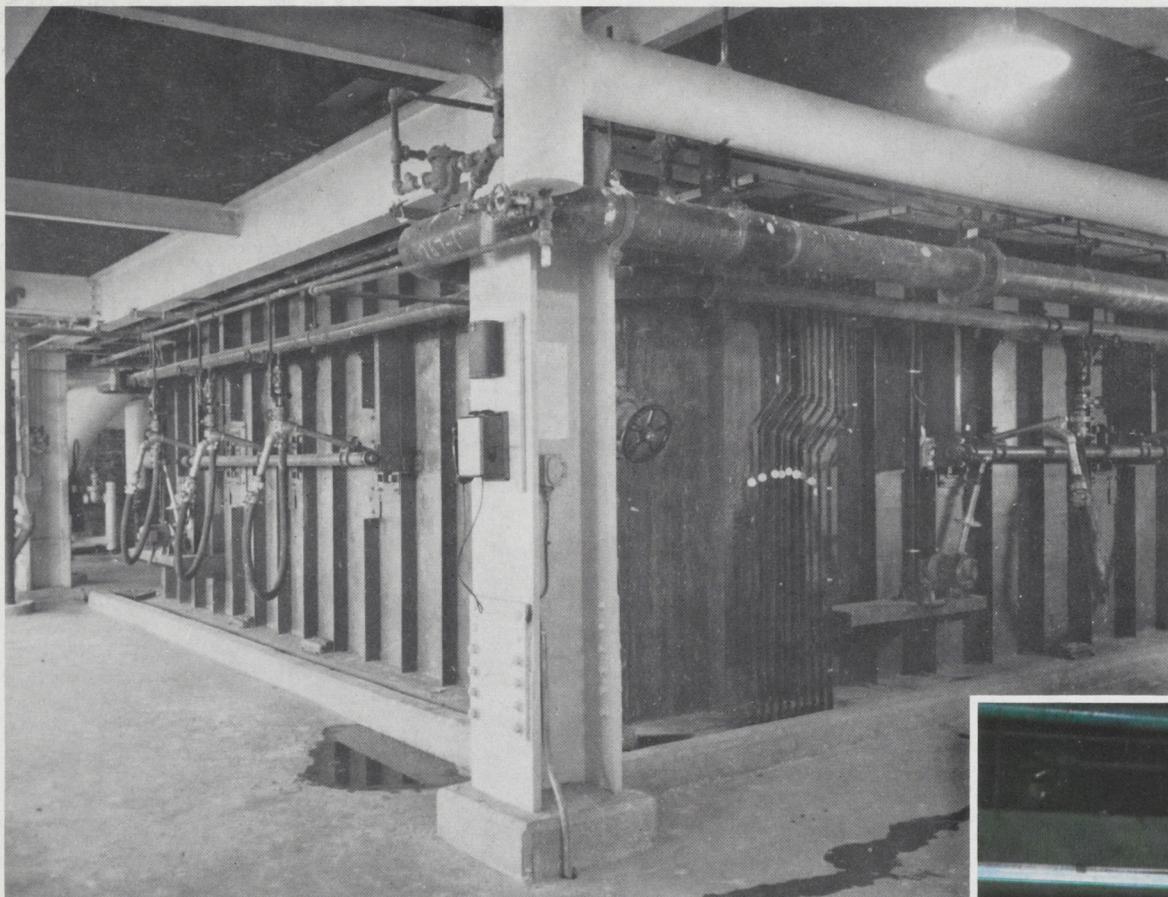


*The Lowerator-Stacker*



# PLANT FLOW SCHEMATIC





*The Wetlap Machine recovers fibres that would otherwise go into the sewer—pulp from it is used as a base for roofing paper manufacture.*

## CHEMICAL RECOVERY

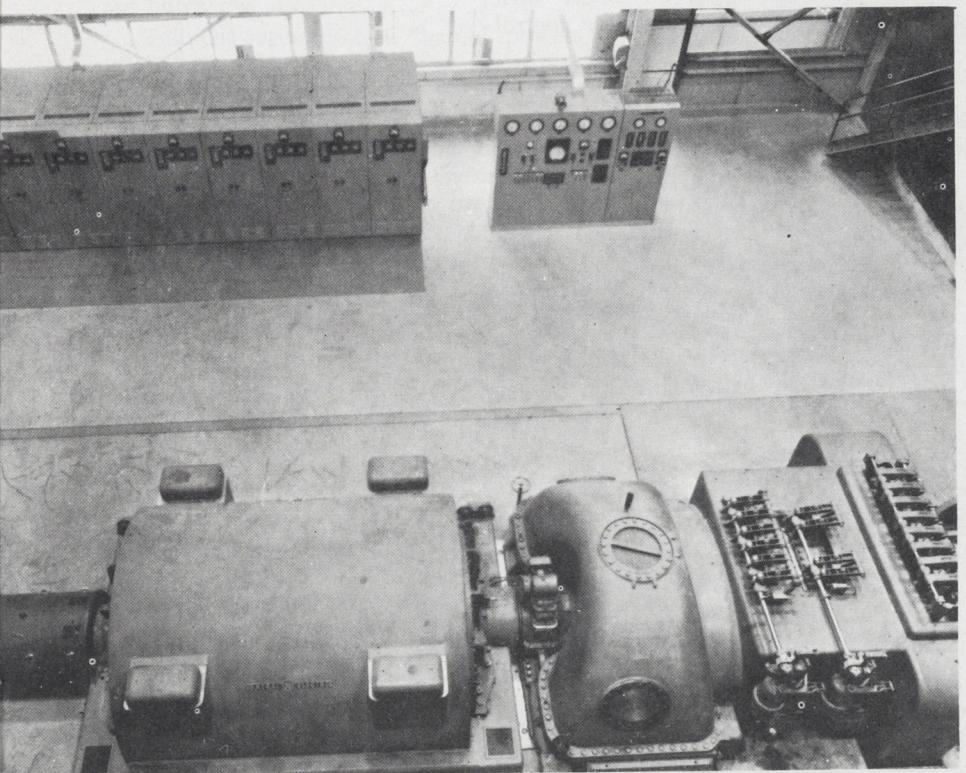
Actually, there is very little waste in North Western's operation. The bark from the logs is dewatered and burned in one of the power boilers. The lignins and binding material in the wood drawn out of the cooking chemicals are burned in another boiler, while the chemicals are recausticized to be used again. Hot water is reclaimed and used over again until there is practically no heat left in the water.



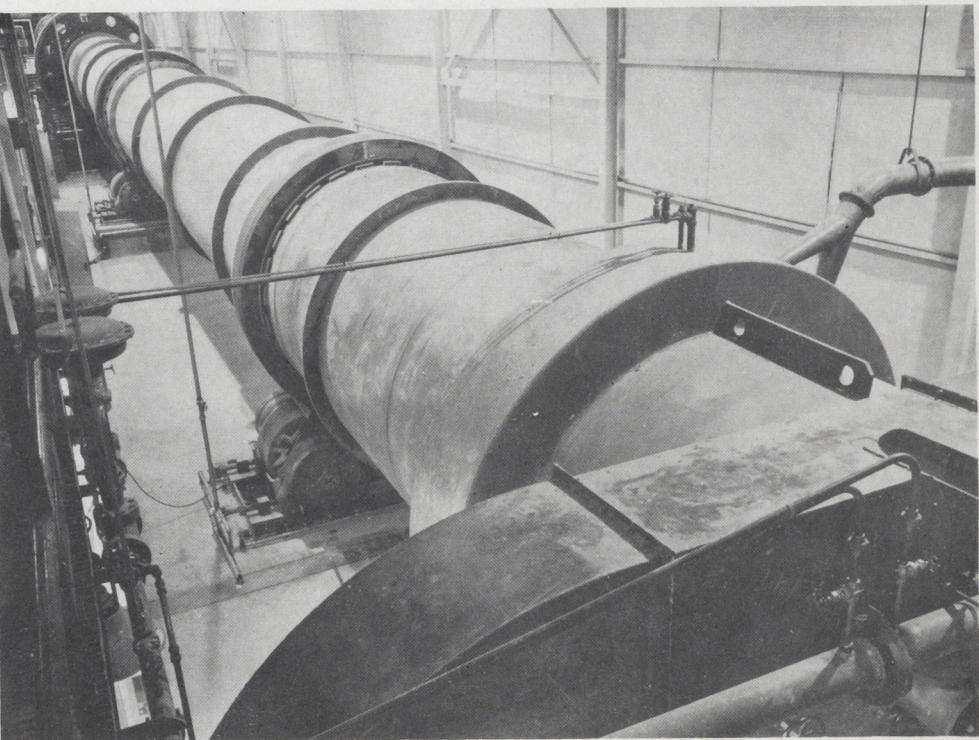
*The laboratory*



*The turbine room*



*The lime kiln*



## SIDELIGHTS

### Quality Control:

Highly skilled chemists, chemical engineers and technicians are constantly sampling and testing every detail of the entire operation to ensure the "whitest white you've ever seen."

In addition to performing tests to ensure a quality product, and to meet the highest standards of both the Technical Association of the Pulp & Paper Industry and of St. Regis' own Central Technical Laboratory, this staff gives assistance to all production functions in the control of the many variables inherent in the operation.

### POWER GROUP

The generator is 21,760 kilowatts at 13,800 volts and is driven by a steam turbine.

It is able to generate over twice its normal capacity because it is cooled by hydrogen instead of air.

Steam and Power for all plant use is generated by one recovery boiler burning black liquor during the liquor recovery process, one combination bark and gas power boiler, and one which burns all gas. Thus there is nothing wasted.

The amount of steam used is about 500,000 to 600,000 pounds per hour at 600 P.S.I.G. and 750 degrees F.

Two auxiliary generators, one using diesel oil exclusively and the other natural gas or diesel, are provided to maintain essential services when necessary to take the main generator off the line.

### THE LIME KILN

The length is 250 feet, the diameter is 9 feet, and the slope is  $\frac{1}{2}$  inch per foot.

It is lined with soapstone and brick. For a third of the way down from the hot end, the brick is 9 inches thick. For the rest of the way, the brick is 6 inches thick.

The limestone that we use comes from Exshaw, Alberta.

### THE DIGESTERS

Volume of each is 10,800 cubic feet.

Size of each is 95 feet in height and 13 feet in diameter.

Each digester has a capacity of 300 tons over 24 hours.

Oxidation towers to recover chemicals and reduce odor. The walls are composed of 2" thick steel. It takes  $2\frac{1}{2}$  hours for the pulp to move from the top to the bottom of the digesters.

### THE BLEACH PLANT

Designed for a rated capacity of 430 tons per day. Present capacity is 700 tons per day.

Approximate time to bleach pulp is 8 to 9 hours through six stages.

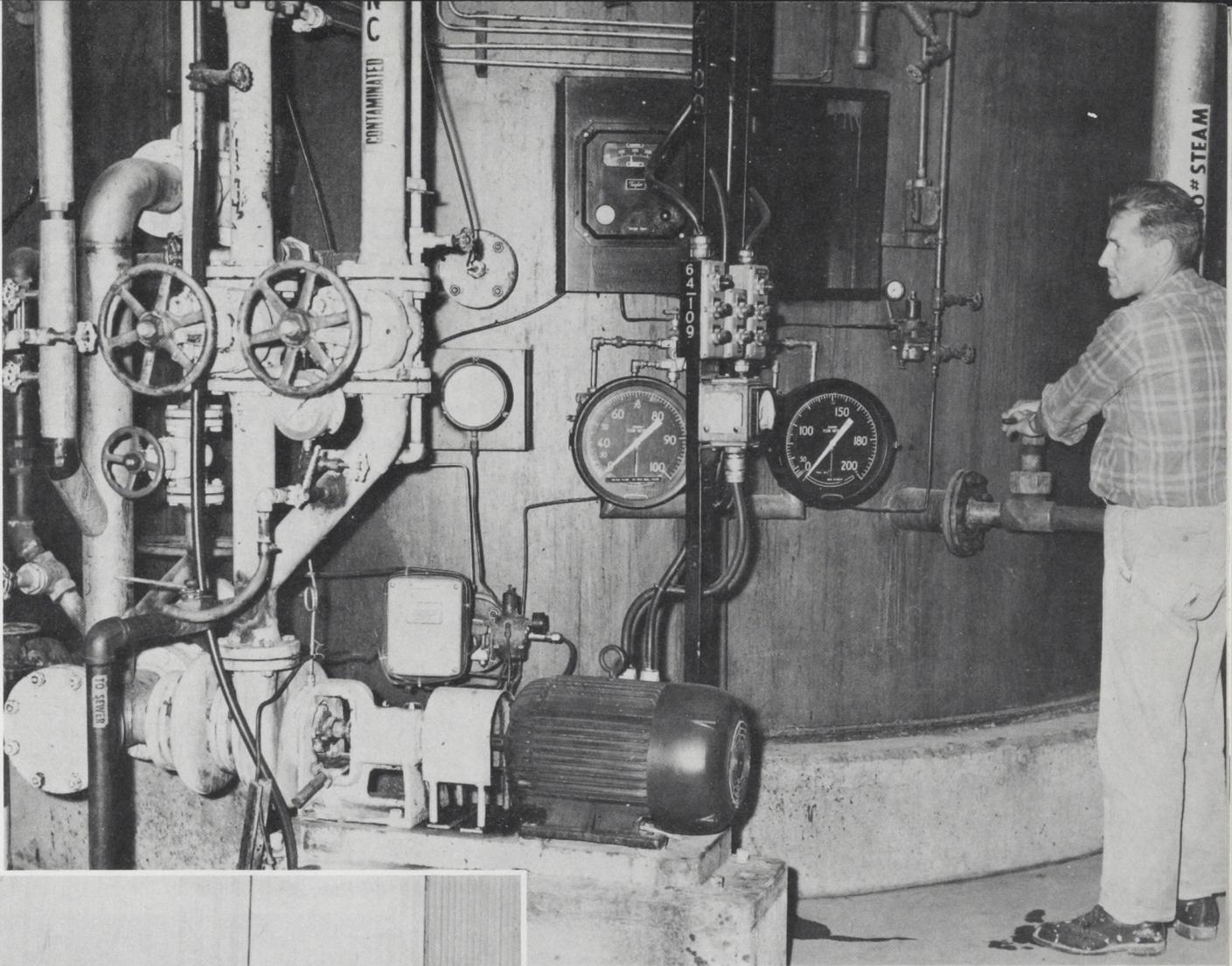
One bleach liquor made in our plant is the same product that a housewife uses to wash clothes with, and that comes under such trade names as Perfex.

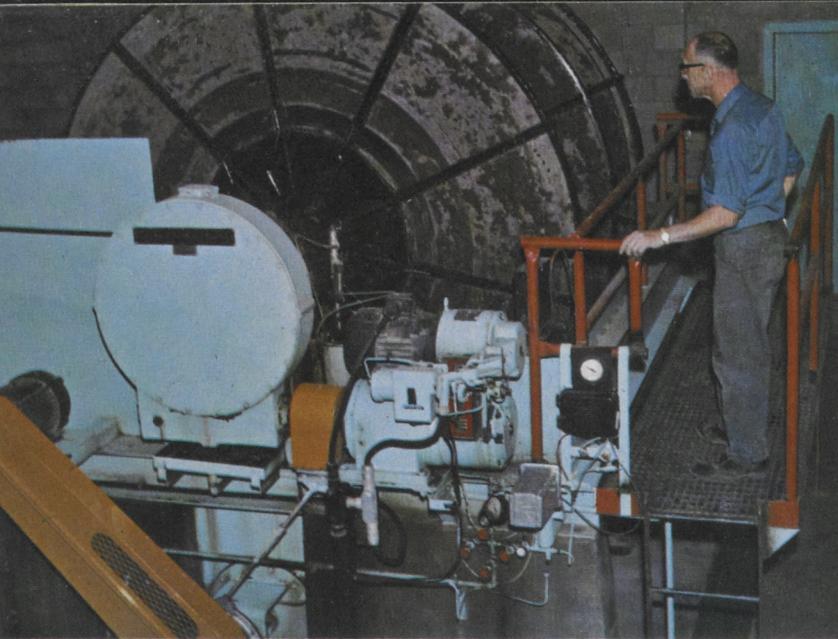
## TALL OIL PLANT

"Tall Oil" is a mixture of resin and fatty acids recovered as a by-product from the black liquor system. It has potential applications in a large field of industries: adhesives, paints, varnishes, linoleum, polishes, soaps, papersizes and disinfectants are but a few uses.

Tall Oil recovery is a "batch" process utilizing two former waste products as new materials. (Black liquor soap and chemical plant acid effluent.)

Production rate of tall oil is in the order of 3,000 tons per year. The plant was put into operation in 1964, to produce our first marketable by-product.





*Solids extraction*



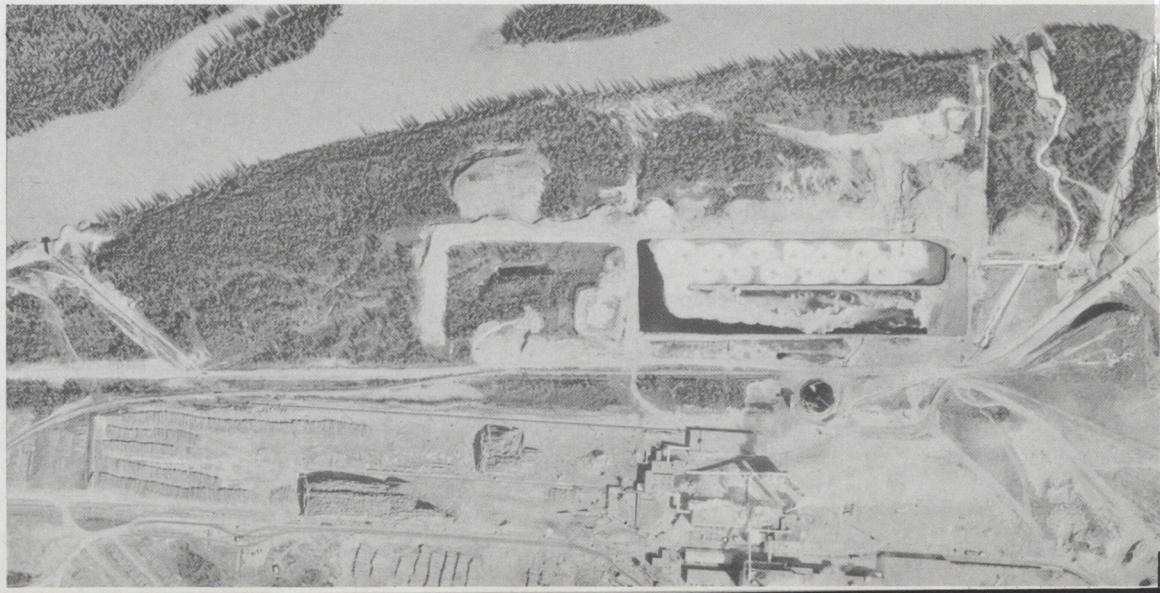
*Discharge to river*

## EFLUENT TREATMENT

The waste water from the mill is split into three streams; Bleach Plant Acid Sewer, Bleach Plant Alkali Sewer, and Mill General Sewer which is all the mill sewers with the exception of the two above. The Mill General and Bleach Plant Alkali Sewer plus a portion of the Acid Sewer are first clarified to remove suspended solids and then aerated in a Bacteriological Lagoon to remove any oxygen demanding materials. The portion of the Acid Sewer that is not treated is low in suspended solids and oxygen demand and requires no treatment.

Suspended solids are reduced by 80% through a Primary Clarifier. Secondary Aeration is accomplished with 14-50 HP surface Aerators in a 21-acre Lagoon. Here the mill effluent is stored for 5 days, 3 days aeration and 2 days additional settling. All the domestic sewage from the Town of Hinton is treated through the secondary aeration. Upon discharge from the Lagoon the effluent joins the small portion of by-passed acid effluent, cascades down a rock bed, and finally discharged by a Sparger Pipe for even distribution across the Athabasca River. The discharge is monitored by the mill and checked periodically by the Department of Health to ensure that standards are continually met so that the natural condition of the river can be maintained.

*Clarifier and ponds*



## SIDELIGHTS

### Water Treatment:

Water used in the mill and in the townsite is treated, filtered and chlorinated in a large water treatment plant 368 feet in length by 120 feet in width. Approximately 30,000,000 gallons of water are treated each day.

### Service Departments:

Assisting behind the scenes are the Industrial Relations, the Purchasing, the Engineering, the Technical, the Accounting and the Traffic Departments—all of them doing their part to manufacture Alberta Hi-Brite.

### ALBERTA HI-BRITE

The final product. Alberta Hi-Brite is a high quality Kraft pulp used in the manufacture of fine papers, food cartons, photographic papers and other paper products which require a strong, clean, bright pulp. Alberta Hi-Brite is sold mostly in the Eastern United States by St. Regis Paper Co., who, themselves, buy a large amount for use in manufacturing various paper products.

*Water intake*



## GLOSSARY OF INTERESTING POINTS

### THE COMPANY

North Western Pulp and Power Limited is the first Pulp Mill in Alberta.  
St. Regis Paper Company is one of the largest in the world.  
The pulp and paper industry is the largest in Canada.  
The plant site consists of 150 acres of fenced area.

### WATER TOWER

Is 220 feet tall and holds 150,000 gallons.

### THE WOODYARD

Three 60 ton mobile cranes with 100 foot booms.  
Two log unloaders - one 45 ton and one 60 ton capacity.  
Thirty 50 foot monitor fire towers strategically situated.  
A slasher deck to convert long logs to 8 foot wood.  
The flume is 1,812 feet long.  
The pulp wood storage area covers 80 acres.  
The wood flow in the flume is roughly 5 feet per second.

### THE WOODROOM

Total capacity is more than 1,000 cords per day (it takes approximately two cords of pulp wood to make one ton of pulp).  
The drum barkers are 67½ feet in length and 12 feet in diameter.  
It takes three 8 hour shifts in the woodroom to support the operations of the plant.  
The drum barkers produce from 18 to 35 cords an hour depending on the difficulty of barking.  
The chipper knives turn 400 revolutions per minute. It takes 800 horse power to drive each chipper.

### THE SILOS

Each silo holds roughly 500 units (a unit is equal to 200 cubic feet).  
The height of the silos is 88 feet.  
The 3 silos together hold enough chips to keep the mill going for 1½ days.  
The turntable of each silo is remotely controlled from the master panel at the digestor operating floor.

### **RECOVERY FURNACE**

Is the most up-to-date type; fires from all four sides.

Recovers enough chemical to produce 600 tons of pulp a day.

Is six storeys high and fully automatic. Temperature is 1500 degrees at bottom of furnace.

Stack is 250 feet high.

When the boiler was installed in 1957 it was one of the largest of its type in the world.

Electrostatic Precipitator to recover chemicals from going up stack.

No pulp mill of this type could afford to continue without operation of recovering the chemicals used in the cooking process. The black liquor is pumped back to the recovery room where the chemicals are reconverted and recovered.

### **MACHINE ROOM**

Minton Dryer is one of the largest in the world.

Dryer section consists of 66 dryer cylinders each 5 feet in diameter.

Bailing press has a pressing potential of 1,000 tons.

Bales weigh 569 lbs. each and are approximately 30"x32"x14" in size.

Pulp producing expectancy of this mill approximately eleven cars a day.

### **PULP STORAGE WAREHOUSE**

Size, 360'x160' of 57,600 square feet. Capacity, approximately 46,080 bales or 11,520 tons.

### **SIX LARGE PLANTS**

In our pulp making process we use six plants, each one of which is an individual factory and yet all forming an integral part of the main function.

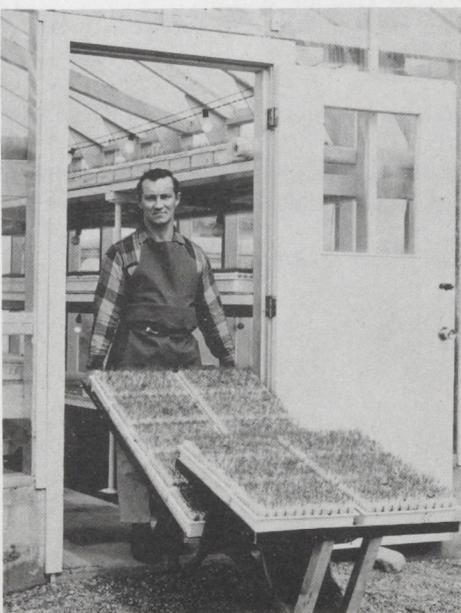
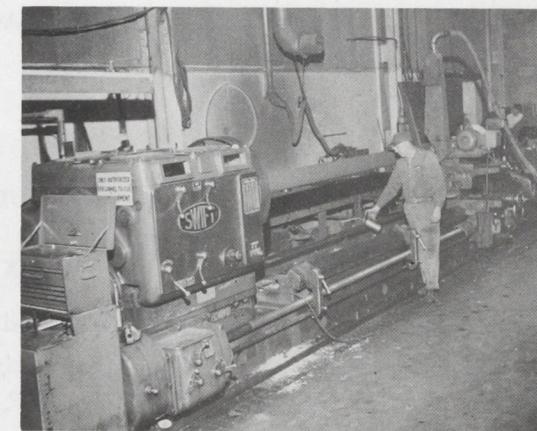
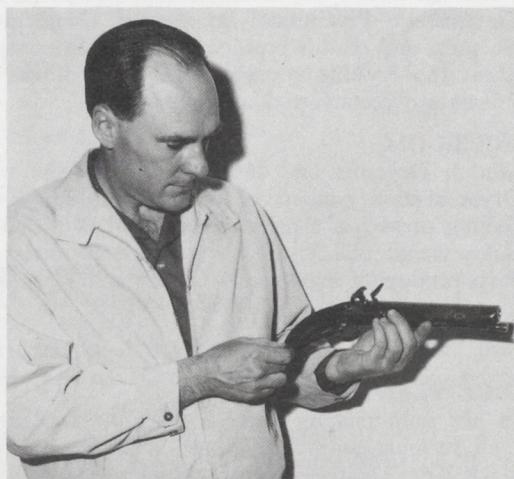
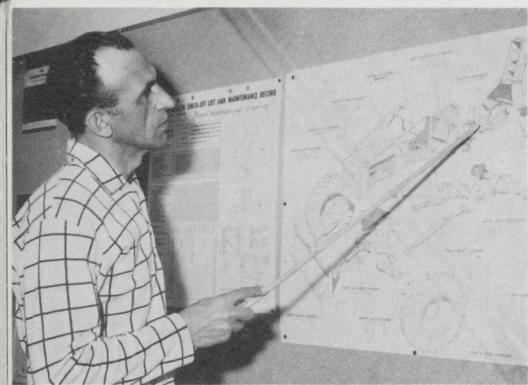
1. A large chemical plant manufacturing caustic soda from soda ash.
2. A small chemical plant which produces chlorine dioxide.
3. A power generating plant, generating enough power to service a small city.
4. A water treatment plant.
5. Pulp producing plant.
6. Tall oil plant.

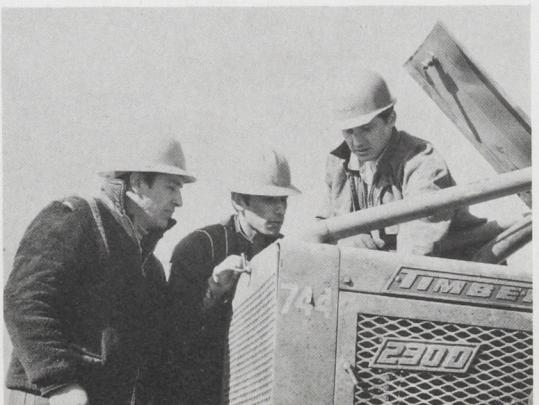
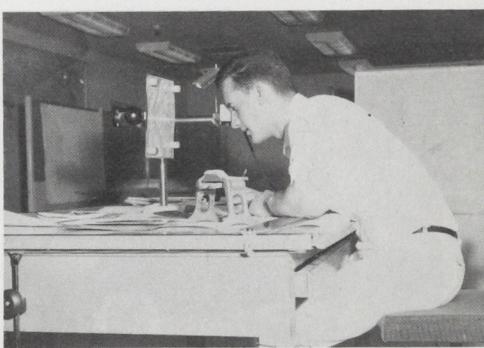
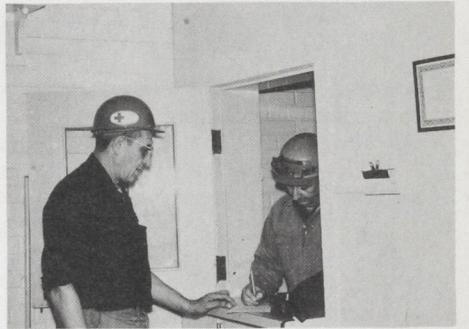
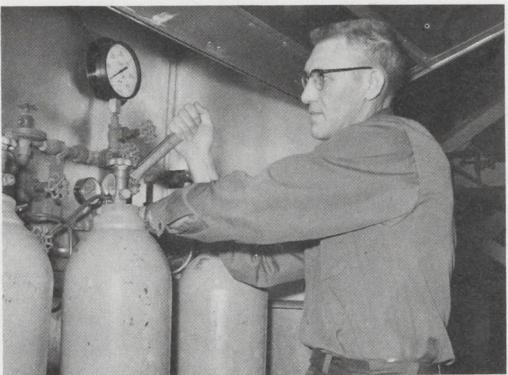
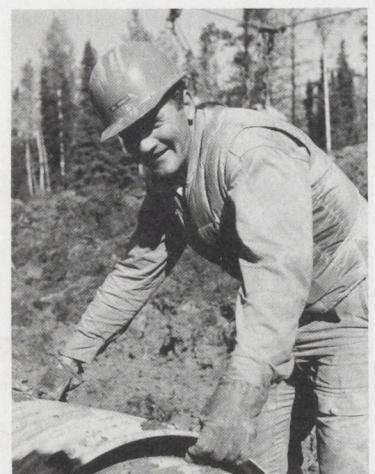
### **WOODLANDS**

The Company has two million acres leased and two million acres reserved for future expansion.

The Company operates in eight cutting areas during the year with between 20 and 25 men to each crew.

The pulpwood is hauled by large trucks under contract.





## **FOREST MANAGEMENT**

North Western's Forest Management area embraces approximately 4,000,000 acres of wild lands from which it must ensure a perpetual supply of raw wood to satisfy its continuing needs. In order to accomplish this objective, no more than an amount equal to the annual growth on the management area can be harvested. A harvest is reaped . . . and converted to a saleable pulp product . . . but the basic wood resource is renewable. New forests are made to grow where mature forests were harvested so that generations to come can enjoy similar and even increased beauties.



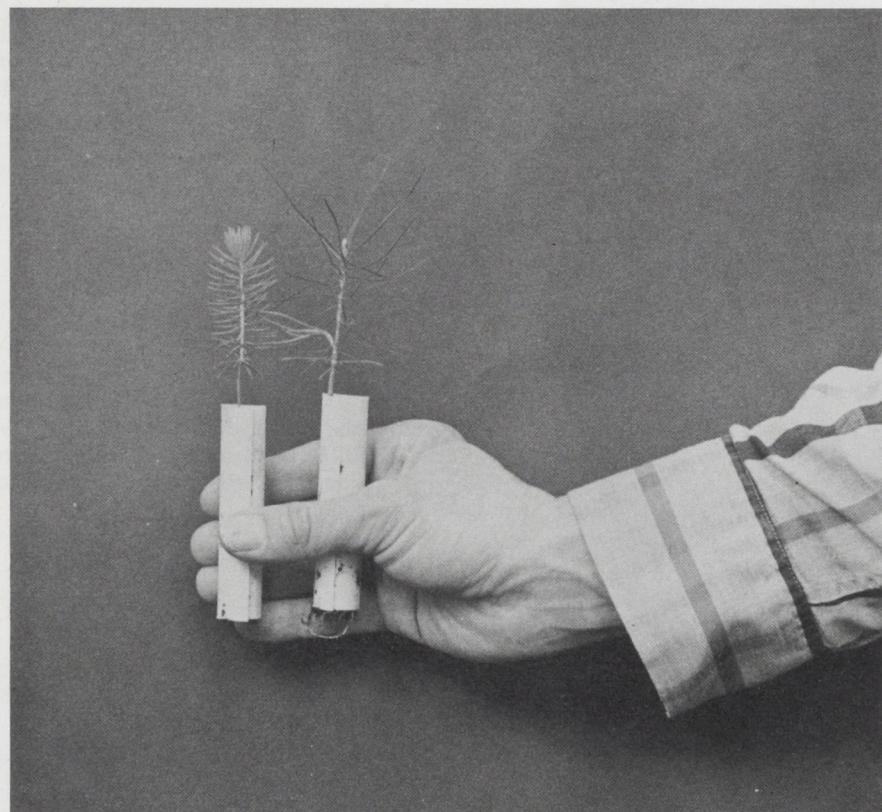
## CLEAR-CUTTING

An example of clear-cutting patterns in mature lodgepole pine stands. The residual blocks of timber will not be removed until the clear-cut patches have been successfully regenerated. 10,000-12,000 acres a year are harvested in order to satisfy annual mill requirements.

## SCARIFICATION

Powerful tractors scarify the clear-cut blocks following harvesting operations, crushing the debris and mixing with the surface soil, so as to reduce the fire hazard and to prepare a receptive seed-bed for the future crop.





## PLANTING

If adequate natural regeneration does not occur following harvest operations the clear-cut areas are planted with either white spruce or lodgepole pine seedlings.





## REGENERATION

Successfully regenerated patch which was clear-cut ten years previously. The residual block in the background can now be removed.

## FERTILIZATION

Research into new and better methods of forest management is continuous and includes the experimental aerial application of fertilizers to hasten the establishment and growth of natural regeneration following clear cutting.



## YOU CAN MAKE PAPER

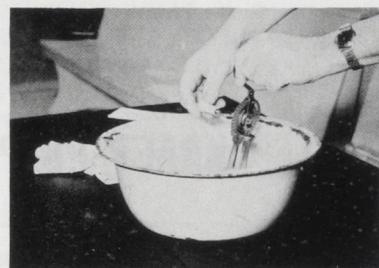
North Western does not make paper products at Hinton, but you can learn at first hand why paper mills like to use Alberta Hi-Brite. You can make a piece of paper! The method given here is in principle the same as that used by the papermaker, although of course he uses more sophisticated and complex machinery, and he can select from a wide variety of dyes, pigments, sizing and resins—called “furnish”—to make different types of paper products.

To make a piece of paper you will need:—



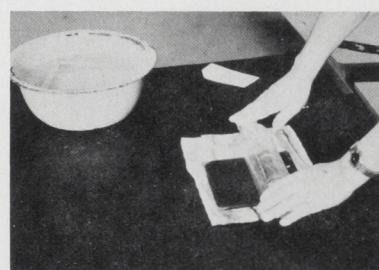
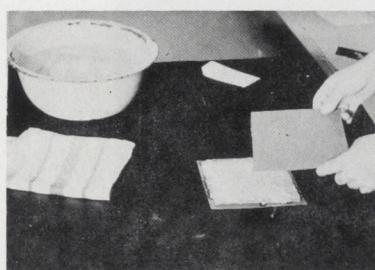
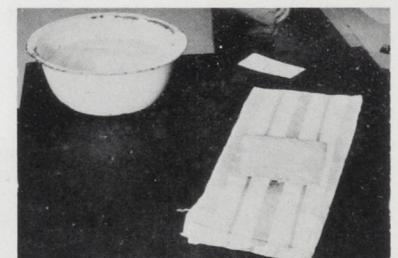
1. 1 oz. starch
2. Large bowl
3. Hand mixer
4. Pulp sample
5. Tray with bottom cut out
6. Wire gauze
7. 4 pieces white blotting paper
8. Rolling pin
9. Domestic iron
10. Scissors
11. 2 gallons water
12. Mop-up towel
13. Plastic counter top

## STEP BY STEP INSTRUCTIONS



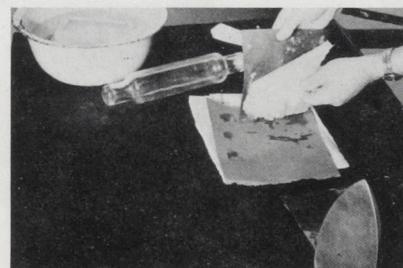
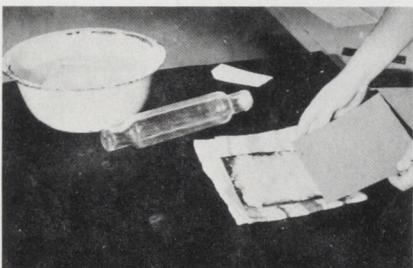
2. Slowly pull the tray through the water to collect an even coating of fibres on the wire gauze. Remove the gauze carefully and place it on the towel, fibres up, to remove excess water.

1. Fill bowl with approximately two gallons of water and add starch. Wet the pulp sample, pull it into small pieces and drop into water. Beat thoroughly with mixer to get pulp fibres separately suspended in the water — avoid lumps.



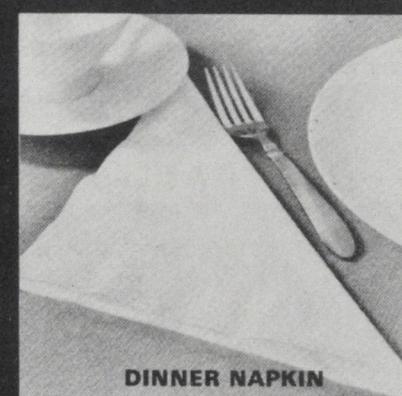
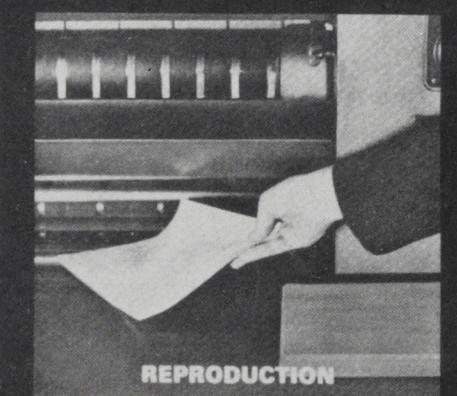
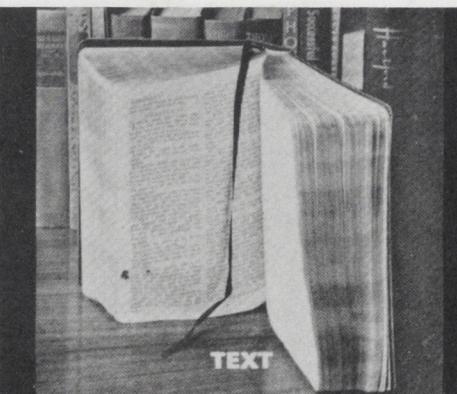
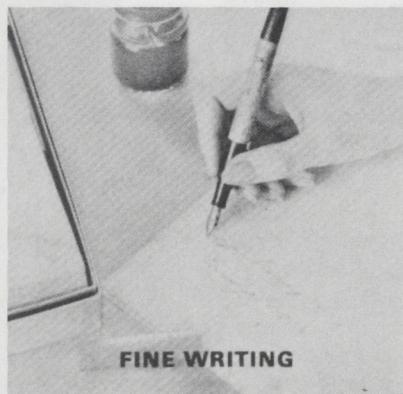
4. Put the blotting paper with pulp fibres between two further sheets of blotting paper, and iron on both sides of sandwich with medium heat until sample is dry. YOU NOW HAVE A PIECE OF HAND-MADE PAPER. Peel it from the blotting paper carefully and trim edges with scissors.

3. Place wire and pulp between two sheets of blotting paper, and roll to remove water — carefully at first to avoid washing out fibres, and gradually applying more pressure to remove as much water as possible and ensure that the pulp fibres stick to the blotting paper.



## THIS HAS BEEN THE STORY OF "HI-BRITE" KRAFT PULP

Hi-Brite is a fine grade of kraft pulp, and its whiteness and strength are recognized as standards in the industry. It is used to improve the quality of such a variety of paper products that another booklet would be needed just to show the uses of Hi-Brite. Here are just a few:



WE HOPE THAT YOU HAVE ENJOYED THIS VISIT WITH US AT NORTH WESTERN PULP & POWER LTD. IF YOU WERE NOT ABLE TO BE HERE IN PERSON, THIS BOOKLET WILL ACQUAINT YOU WITH OUR OPERATION, SO THAT YOU WILL UNDERSTAND IT BETTER WHEN YOU ARE ABLE TO COME TO HINTON. IF YOU WERE HERE IN PERSON, THIS BOOKLET MAY HELP REMIND YOU OF THE MANY THINGS YOU SAW WHILE YOU WERE HERE.



*"Hinton — Home of the Canadian Antique Car Derby"*

**NORTH WESTERN  
PULP & POWER LTD.**  
HINTON                            ALBERTA

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OF  
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